



**UNSW**  
AUSTRALIA

Never Stand Still

Engineering

Mechanical and Manufacturing Engineering

**MMAN2130**

**DESIGN AND MANUFACTURE**

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# 1. Staff contact details

## Contact details and consultation times for course convenor

Name: Prof. S. Kara  
Office location: Ainsworth  
Tel: (02) 9385 5757  
Email: [S.Kara@unsw.edu.au](mailto:S.Kara@unsw.edu.au)

## Contact details and consultation times for additional lecturers/demonstrators/lab staff

Name: Georg Bienert  
Office location: Ainsworth  
Tel: (02) 9385 6851  
Email: [g.bienert@unsw.edu.au](mailto:g.bienert@unsw.edu.au)

Name: Shiva Abdoli  
Office location: Ainsworth  
Tel: (02) 9385 6851  
Email: [s.abdoli@unsw.edu.au](mailto:s.abdoli@unsw.edu.au)

Name: Ashley Thornton  
Office location: Ainsworth  
Tel: (02) 9385 6851  
Email: [ashleyjulianthornton@gmail.com](mailto:ashleyjulianthornton@gmail.com)

# 2. Course details

## Credit Points

This is a 6 unit-of-credit (UoC) course, and involves 7.5 hours per week (h/w) of contact.

The UNSW website states “The normal workload expectations of a student are approximately 25 hours per semester for each UoC, including class contact hours, other learning activities, preparation and time spent on all assessable work.”

For a standard 24 UoC in the semester, this means 600 hours, spread over an effective 15 weeks of the semester (thirteen weeks plus stuvac plus one effective exam week), or 40 hours per week, for an average student aiming for a credit grade. Various factors, such as your own ability, your target grade, etc., will influence the time needed in your case. Some students spend much more than 40 h/w, but you should aim for not less than 40 h/w on coursework for 24 UoC.

This means that, for this course, you should aim to spend not less than an additional 2.5 hours per week of your own time for the weeks where there are 7.5 hours of contact. This

should be spent in making sure that you understand the material presented, completing the set tasks, further reading about the requirements for the project.

There is no parallel teaching in this course.

### Contact hours

	Day	Time	Location
<b>Lectures</b>	Tuesday	10:00-12:00	Ainsworth Building G02
<b>CAD Lab</b>	Tuesday	12:00-13:30	Ainsworth Building 203
<b>TAFE</b>	Wednesday	16:30-21:30	Check TAFE information on Moodle
	Thursday	16:30-21:30	

### Summary of the course

This subject introduces you to basic aspects of design and manufacturing, process selection, manufacturing processes, material properties/selection and the use of computers in the design process..

### Aims of the course

This is one of the introductory technology-based courses in the school. This course develops an appreciation of the concepts involved with product development and manufacture. The other subjects in the degree program further develop the theoretical and analysis methods for design and development.

This is a project-based course. The project selected allows you as a student to work individually and in a team environment to achieve the final objective, which is a workable product. In carrying out this work the student is exposed to design principles and drawing practices which includes Computer aided Design and Drafting, manufacturing processes and practical selection and limitations of manufacturing components and products. A continuing emphasis is placed on group work and report writing essential to engineering.

### Student learning outcomes

This course is designed to address the learning outcomes below and the corresponding Engineers Australia Stage 1 Competency Standards for Professional Engineers as shown. The full list of Stage 1 Competency Standards may be found in Appendix A.

After successfully completing this course, you should be able to:

Learning Outcome		EA Stage 1 Competencies
1.	Understand the importance and relevance of graphical communication in engineering.	PE1.4

2.	Be able to represent a three dimensional object in two dimensional space in accordance with AS-1100 technical drawing standards and conventions.	PE1.3, PE2.2
3.	Be able to interpret two dimensional engineering drawings and produce isometric sketches of relevant components.	PE1.3, PE2.2
4.	Be able to use the SolidWorks modeling software and application to create a range of engineering components in solid representation to create production drawings of engineering components in accordance with AS-1100 technical drawing standards.	PE1.3, PE2.2
5.	Be familiar with the basic engineering and physical properties of common engineering materials and how to select them for a given design.	PE1.3, PE1.5
6.	Be familiar with the link between product design, material selection and manufacturing.	PE1.3, PE2.4
7.	Able to understand some manufacturing processes and their capabilities.	PE1.3, PE2.4
8.	Able to work in a group to determine the manufacturing requirements and functionality of the product.	PE2.4, PE3.5, PE3.6
9.	Able to relate to economic requirements for manufacturing and thus optimise the production of the component.	PE2.4

### 3. Teaching strategies

This course is being conducted as a project based course in which the material being presented is related to the tasks that a student needs to attempt to achieve the final goal of the project. Therefore the presentation of the material will vary from week to week. Initially there will be lectures and problem solving classes to guide you through the project while in the later weeks you will be required to be self sufficient to finalise the project. However the project will be monitored over the different periods for the milestones achieved. Each of the milestones will be evaluated by a panel of members made up of academic, and workshop staff.

There will be laboratory work for hands-on experience in creating the design that you have developed. In relation to the product development it is expected that the students will be able to search for information and requisites for the development of the product using the web, library and books which are listed as resources for the product development.

### 4. Course schedule

All lectures in this course are given by Prof. S. Kara unless stated otherwise.

Tuesday	10:00-12:00	Ainsworth Building GO2
CAD Labs	(check allocated time)	Ainsworth Building 203 (K-J17-203)
TAFE	(check allocated time)	See the information booklet on Moodle

Green indicates and assessment week

Date	Topic	Location	Lecture Content	Demonstration/Lab Content	Suggested Readings
26/7/16	Intro and Group Project Description	Ainsworth Building G02	Intro to MMAN2130, Group project outline, TAFE & Lab Info. drawings	No CAD lab	Pump Requirement Specification
2/8/16	Concept Sketching	Ainsworth Building G02	Techniques useful for concept sketching	Introduction to SolidWorks	Week 2 Lecture Notes
9/8/16	3D Part Modeling	Ainsworth Building G02	Sketching & Modeling parts in 3D	2D Sketching only	Week 3 Lecture Notes
16/8/16	Engineering Drawings	Ainsworth Building G02	AS1100 standards, dimensioning	3D Part Modeling	Week 4 Lecture Notes and Engineering Drawing Assessment Guide
23/8/16	Limits Fits & Tolerances	Ainsworth Building G02	Limits, Fits and tolerances and their application in design.	Aesthetics like threads and surface finishing	Week 5 Lecture Notes
30/8/16	Process Planning	Ainsworth Building G02	Process Plan Assembly Plan BOM	Assemblies and mating	Week 6 Lecture Notes
6/9/16	Design for high volume Manufacture	Ainsworth Building G02	Design for Manufacturability, Material Selection and High Volume Manufacturing	Generating BOM's	Week 7 Lecture Notes + Final Report Assessment Guide
13/9/16	Material Selection Introduction	Ainsworth Building G02	Utilizing Material Index's	Patterning & Mirroring	Week 8 Lecture Notes
20/9/16	Material Selection - Activity	Ainsworth Building G02	Design for Manufacture, Material Selection and High Volume Manufacturing	CAD Test	Week 9 Lecture Notes and CAD Test Assessment Guide
27/9/16	Session Break				

4/10/16	Material Selection - Detail	Ainsworth Building G02	Design for Manufacture, Material Selection and High Volume Manufacturing	No Labs	Week 10 Lecture Notes
11/10/16	Advanced Manufacturing Techniques	Ainsworth Building G02	Design for Manufacturability, Material Selection and High Volume Manufacturing	No Labs	Week 11 Lecture Notes and Final Report Assessment Guide
18/10/16	Product Life Cycle Design and Sustainability	Ainsworth Building G02	Sustainability, Life Cycle Engineering and DFX	No Labs	Week 12 Lecture Notes
25/10/16	No Lecture	TBD	Prototype Testing	No Labs	NA

## 5. Assessment

You are assessed by way of a product development project which involves designing and manufacturing a product based on given functional specifications. This project will test your ability to demonstrate applied knowledge, which you will be expected to perform as an engineering student.

The weighting of the individual assessment components will be as follows with full details on each assessment provided under Moodle/Assignments.

Assessment	Due date and submission requirement	Weight %	Learning Outcomes Assessed	Details	Marks returned
Concept Sketch + Engineering Drawing	Week 6, in the classroom	15	1,2,3,4	Individual submission	Two weeks after submission
Manufacturability Review	Week 7, in the classroom	10	1,2,3,4,5,6	Individual submission	Two weeks after submission
CAD Test	Week 9 During CAD Lab.	10	1,2,3,4	Individual assessment	Two weeks after submission

Final Report	Week 12, in the classroom	35	1,2,3,4	Group + Individual assessment	Two weeks after submission
Prototype Testing	Week 13 TBD	10	8	Group submission	Two weeks after submission
TAFE Assessments	TAFE will announce	20	5,6	Individual assessment	TBA

## Assignments

### *Presentation*

All submissions should have a standard School cover sheet which is available from this course's Moodle page.

All submissions are expected to be neat and clearly set out. Your results are the pinnacle of all your hard work. Presenting them clearly gives the marker the best chance of understanding your method; even if the numerical results are incorrect.

### *Submission*

Late submissions will be penalised 5 marks per calendar day (including weekends). An extension may only be granted in exceptional circumstances. Where an assessment task is worth less than 20% of the total course mark and you have a compelling reason for being unable to submit your work on time, you must seek approval for an extension from the course convenor **before the due date**. Special consideration for assessment tasks of 20% or greater must be processed through [student.unsw.edu.au/special-consideration](http://student.unsw.edu.au/special-consideration).

It is always worth submitting late assessment tasks when possible. Completion of the work, even late, may be taken into account in cases of special consideration.

## Examinations

You must be available for all tests and examinations. Final examinations for each course are held during the University examination periods, which are June for Semester 1 and November for Semester 2.

Provisional Examination timetables are generally published on myUNSW in May for Semester 1 and September for Semester 2

For further information on exams, please see the [Exams](#) section on the intranet.

### *Calculators*



You will need to provide your own calculator, of a make and model approved by UNSW, for the examinations. The list of approved calculators is shown at [student.unsw.edu.au/exam-approved-calculators-and-computers](http://student.unsw.edu.au/exam-approved-calculators-and-computers)

It is your responsibility to ensure that your calculator is of an approved make and model, and to obtain an “Approved” sticker for it from the School Office or the Engineering Student Centre prior to the examination. Calculators not bearing an “Approved” sticker will not be allowed into the examination room.

### **Special consideration and supplementary assessment**

For details of applying for special consideration and conditions for the award of supplementary assessment, see the School [intranet](#), and the information on UNSW’s [Special Consideration page](#).

## **6. Expected resources for students**

- (1) *Manufacturing Engineering and Technology*, S. Kalpakjian and S R Schmid. Prentice Hall
- (2) *Engineering Drawing*, A. W. Boundy, McGraw Hill (7<sup>th</sup> Edition).
- (3) *Material Selection in Mechanical Design*, Ashby, M., Elsevier.
- (4) *Dimensioning and Tolerancing for Function and Economic Manufacture*, L. E. Farmer, Blueprint Publications.
- (5) *Manufacturing Processes* B.H. Amstead, P.F. Ostwald and M.L. Begeman.
- (6) *Materials and Processes in Manufacturing*, E.P. Degamo, J.P. Black and R.A. Kohser.
- (7) *Product Design and Process Engineering*, B.W. Niebel and A.B. Draper.
- (8) *Manufacturing Processes*, H.W. Yankee.
- (9) Moodle based learning modules.

Additional material can be found at the UNSW Library via <http://info.library.unsw.edu.au/web/services/services.html>

### **Additional materials provided in Moodle**

Course will be administered by using Moodle. Therefore course administration and lecture materials will be uploaded to Moodle. Students are advised to use Moodle for class communication

## **7. Course evaluation and development**

Feedback on the course is gathered periodically using various means, including the Course and Teaching Evaluation and Improvement (CATEI) process, informal discussion in the final class for the course, and the School’s Student/Staff meetings. Your feedback is taken seriously, and continual improvements are made to the course based, in part, on such feedback.

Feedback on the course is gathered periodically using various means, including the Course and Teaching Evaluation and Improvement (CATEI) process, informal discussion in the final class for the course, and the School's Student/Staff meetings. Your feedback is taken seriously, and continual improvements are made to the course based, in part, on such feedback.

In this course, recent improvements resulting from student feedback include the inclusion of the weekly quiz into the assessment schedule and providing more information on pump design information early in the course.

## 8. Academic honesty and plagiarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism: [student.unsw.edu.au/plagiarism](http://student.unsw.edu.au/plagiarism) The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

If plagiarism is found in your work when you are in first year, your lecturer will offer you assistance to improve your academic skills. They may ask you to look at some online resources, attend the Learning Centre, or sometimes resubmit your work with the problem fixed. However more serious instances in first year, such as stealing another student's work or paying someone to do your work, may be investigated under the Student Misconduct Procedures.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis) even suspension from the university. The Student Misconduct Procedures are available here:

[www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf](http://www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf)

Further information on School policy and procedures in the event of plagiarism is available on the [intranet](#).

## 9. Administrative matters

All students are expected to read and be familiar with School guidelines and policies, available on the intranet. In particular, students should be familiar with the following:

- [Attendance, Participation and Class Etiquette](#)
- [UNSW Email Address](#)
- [Computing Facilities](#)
- [Assessment Matters](#) (including guidelines for assignments, exams and special consideration)
- [Academic Honesty and Plagiarism](#)
- [Student Equity and Disabilities Unit](#)
- [Health and Safety](#)
- [Student Support Services](#)

*Prof. S. Kara*  
10-7-2016

## Appendix A: Engineers Australia (EA) Stage 1 Competencies for Professional Engineers

	<b>Program Intended Learning Outcomes</b>
<b>PE1: Knowledge and Skill Base</b>	PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals
	PE1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing
	PE1.3 In-depth understanding of specialist bodies of knowledge
	PE1.4 Discernment of knowledge development and research directions
	PE1.5 Knowledge of engineering design practice
	PE1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice
<b>PE2: Engineering Application Ability</b>	PE2.1 Application of established engineering methods to complex problem solving
	PE2.2 Fluent application of engineering techniques, tools and resources
	PE2.3 Application of systematic engineering synthesis and design processes
	PE2.4 Application of systematic approaches to the conduct and management of engineering projects
<b>PE3: Professional and Personal Attributes</b>	PE3.1 Ethical conduct and professional accountability
	PE3.2 Effective oral and written communication (professional and lay domains)
	PE3.3 Creative, innovative and pro-active demeanour
	PE3.4 Professional use and management of information
	PE3.5 Orderly management of self, and professional conduct
	PE3.6 Effective team membership and team leadership